PILOT SURVEY TO RECORD THE LITTER FAUNA IN DIFFERENT ECOSYSTEMS OF TARALU ESTATE, BENGALURU

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Abstract

Litter fauna trapped using wet pitfall traps in different ecosystems in Taralu estate area are discussed. In this pilot survey, fauna belonging to ten orders belonging to three classes, Insecta (Hymenoptera, Coleoptera, Orthoptera, Diptera, Dermaptera, Hemiptera), Crustacea (Amphipoda and Isopoda) and Arachnida (Araneae and Opiliones) were recorded. The proportionate (frequency of taxa trapped) occurrence of the major taxa was in the order of: Hymenoptera >Coleoptera>Araneae>Orthoptera>Diptera>Amphipoda>Dermaptera>Hemiptera = Isopoda>Opiliones.

Key words: Litter, pitfall, Taralu, Bannerghatta.

Introduction

Soil ecosystem is dynamic with its versatile composition of organisms belonging to different taxonomic groups ranging from bacteria to earthworms. In terrestrial ecosystems, more than 50% of net primary production is returned to the soil via the decomposition of leaf litter, imparting major implications for present and future global carbon budgets[1, 2]. Any organism

inhabiting the soil during part or all of its life is called 'soil organism'. They play an essential role in decomposing organic matter, cycling nutrients and fertilising the soil. According to one estimate, one square meter of rich soil can harbour as many as 1,000,000,000 organisms[3] and75% of them are found in the top 5cm of soil. Based on size, soil biota is categorized into megafauna, mesofauna and microfauna[4].

The present study was undertaken to document the soil macro and mega-fauna of the litter zone in the vicinity of Taralu estate (10° 17'-10° 19' N; 76° 39'-76° 44' E) a small settlement in Bangalore South Taluk, Bangalore Urban district. The study area was selected for the following reasons,

      a. Lack of scientific literature on soil organisms from the study area
      b. Proximity to the Bannerghatta National Park

The Pitfall trapping is widely used in studies of seasonal occurrence, to examine spatial distribution patterns, to compare relative abundance in different micro-habitats, to study daily activity rhythms, and in community surveys[5]. They are excellent tools for detecting first activity and monitoring the season-long activity of walking and crawling soil and litter arthropods, especially those that are active at night[6].Such pitfall trap studies have been undertaken in different parts of India as well[7]. As the approach was a pilot survey the study was undertaken for a short duration and to extend further in future.

Materials and Methods

Study area

The study was carried out in cropland and adjacent uncultivated plots at Taralu estate of Bangalore South taluk adjoining the Bannerghatta National Park.

Sampling

Sampling was done during the summer season in the month of April 2014. The study was conducted for a period of four consecutive days viz., 3, 4, 5and 6th preceded by field survey. During the field survey specific sites to place the pitfall traps were identified. Subsequently, wet Pitfall traps were set randomly in six sites *viz*., areca plantation, mango orchard, sappota orchard, coconut plantation, tilled open land, and bamboo stretch. Plastic glasses having 6.5 cm diameter and 8.0 cm depth were placed in the soil in such a way that its opening remained parallel to the surface level. Ethanol (70%) was used as a preservative filling the bottom of the bowl. Traps were placed equi-distance from each other in each of the aforesaid sites.

The insects and spiders falling in the trap were collected the next morning and preserved in 70% ethyl alcohol with proper labeling of trap number and date for taxonomic evaluation. The fauna were collected the following day so as to account to all the trapped fauna because some trapped insects consume others and some also may fly out. The meteorological data was obtained from the GKVK, UAS Agrometerology department.

Data analysis

Cluster analysis (Unweighted pair-group average-UPGMA) based on the average distance between the taxa collected was done using Past version 3. The analysis was intended to group the taxa based on their frequency of trapping.

Results and Discussion

In the present study fauna belonging to ten orders included under three classes, Insecta (Hymenoptera, Coleoptera, Orthoptera, Diptera, Dermaptera, Hemiptera), Crustacea (Amphipoda and Isopoda) and Arachnida (Araneae and Opiliones) were recorded. The proportionate (frequency of taxa trapped) occurrence of the major taxa was in the order of: Hymenoptera >Coleoptera>Araneae>Orthoptera>Diptera>Amphipoda>Dermaptera>Hemiptera = Isopoda>Opiliones (Table 1 and figure 1). Although members belonging to eleven taxonomic orders were recorded overall during the present survey, the maximum number of taxa (9) trapped was in the coconut plantation site and the minimum was in the Bamboo stretch (5) (figure 1). Two prominent clusters were obtained based on the cluster analysis, that included the frequency

of the taxa trapped during the study period. Orthoptera, Aranea, Hymenoptera and Coleoptera form a cluster and Opiliones, Diptera, Dermaptera, Amphipoda, Hemiptera and Isopoda represent another cluster. The present findings are not compared with other data as it is a pilot study from the location. All the sites (managed) were well irrigated except the bamboo site (natural) hence the latter recorded lower trap catch. No rainfall was recorded during the sampling duration, the mean maximum and minimum temperatures were 34.5 and 18.4 ^{0}C respectively. The months of March, april and may are considered warmest in Bengaluru, with a tropical savanna climate with dry winters.

There is increasing research efforts devoted to understand the role of climate, litter quality and soil organisms on litter decomposition rates and carbon cycling globally. The present study is a miniscule attempt in this regard. Although the survey period and intensity followed in the present study are inadequate, they are first of the kind efforts reporting the ground borne fauna of the study area.

References

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Table 1.Serialisation of litter fauna trapped consecutively in the selected sites

Orders/DOO	Areca plantation				Mango orchard				Sappota orchard				Coconut plantation				Tilled open land				Bamboo stretch			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Orthoptera	X	X	X	0	X	0	X	0	X	0	X	0	X	X	0	0	0	0	0	0	0	0	0	0
Araneae	X	X	X	0	X	X	x	0	X	X	0	X	X	0	X	0	X	0	0	0	0	0	0	0
Opiliones	0	0	0	0	0	0	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hymenoptera	X	X	0	0	X	X	X	0	X	X	X	0	X	X	X	0	X	X	0	0	X	X	0	0
Coleoptera	X	X	0	0	X	0	X	0	X	X	0	0	X	X	X	0	X	X	0	0	X	0	0	0
Diptera	X	0	0	0	X	0	0	0	0	0	0	0	X	X	0	0	X	X	0	0	0	0	0	0
Dermaptera	X	0	X	0	0	0	0	0	0	X	0	0	X	0	0	0	X	0	0	0	X	0	0	0
Dictyoptera	X	0	0	0	X	0	X	0	0	X	0	0	0	0	0	0	X	0	0	0	X	0	0	0
Amphipoda	0	0	0	0	X	0	0	0	0	X	0	0	X	X	0	0	X	0	0	0	0	X	0	0
Hemiptera	0	0	0	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Isopoda	0	0	0	0	0	0	0	0	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0

DOO= Day of observation, X= Recorded, 0=Not recorded
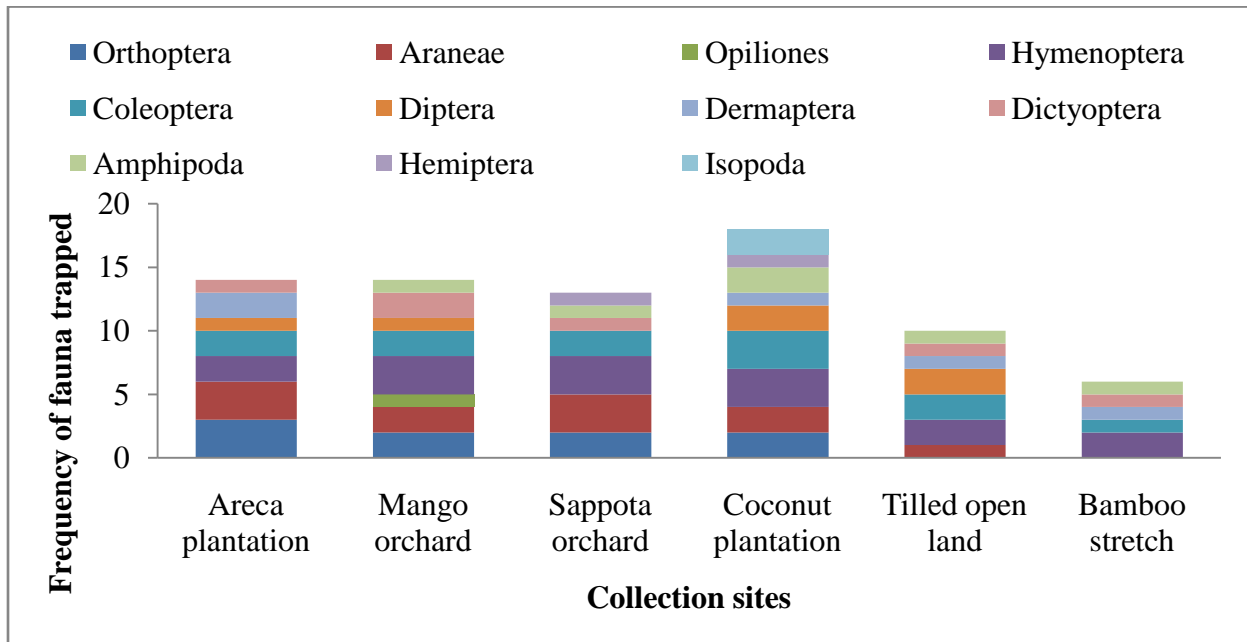
Figure 1. Frequency of trapped soil fauna (order level) in different sites

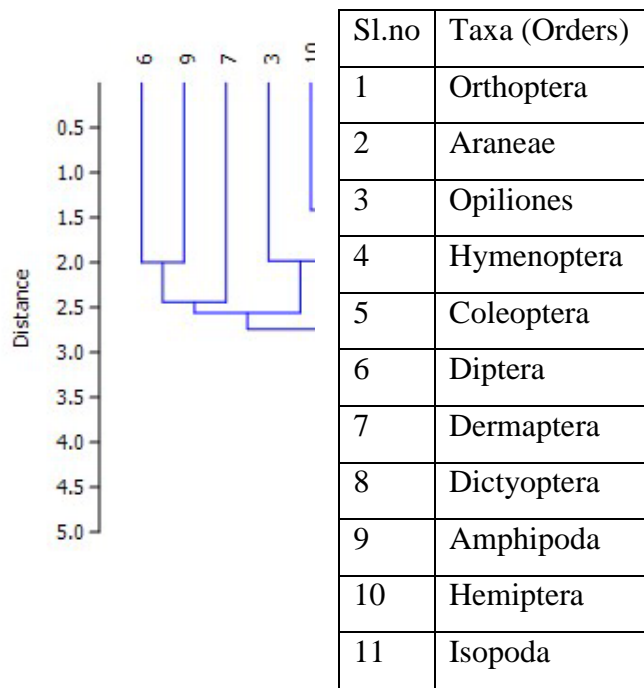| Sl.no	Taxa (Orders)
1	Orthoptera
2	Araneae
3	Opiliones
4	Hymenoptera
5	Coleoptera
6	Diptera
7	Dermaptera
8	Dictyoptera
9	Amphipoda
10	Hemiptera
11	Isopoda

Figure 2. Cluster analysis based on frequency of the taxa trapped in different sites in the study area.